In the Claims:

1. (Amended) A system for cooling coated semiconductor substrates, said system comprising:

a chamber adapted to receive at least one coated semiconductor substrate;

a coupling for placing the chamber in fluid communication with a fluid reservoir;

an inlet valve attached to the coupling for controlling a flow of fluid between the fluid reservoir and the chamber; and

a controller for controlling the inlet valve.

2. The system of claim 1 wherein the coupling is attached to a fluid reservoir and the pressure drop across the inlet valve is at least about 10 bar.

3. The system of claim 2 wherein the pressure drop across the inlet valve is at least about 100 bar.

4. The system of claim 1 wherein the controller controls the temperature of the fluid at a point within the chamber.

5. (Amended) The system of claim 1 further comprising an outlet valve for controlling the flow of fluid out of the chamber, wherein the controller also controls the outlet valve.

6. The system of claim 5 wherein the controller controls the rate of fluid flow through the chamber.

7. The system of claim 1 wherein the fluid entering the chamber from the reservoir substantially mixes with fluid already in the chamber before contacting the substrates.

8. (Amended) The system of claim 7 further comprising a baffle, wherein the fluid flowing into the chamber is directed against the baffle.

21. (Amended) A system for cooling coated semiconductor substrates, said system comprising:

a first sub-system for cooling a fluid using the Joule-Thompson effect; and

a second sub-system for contacting the coated semiconductor substrates with the cooled fluid, the second sub-system being in fluid communication with the first subsystem.